DOCUMENT RESUME

ED 332 913 SO 021 313

AUTHOR Cochrane, Susan Hill; And Others
TITLE Household Consequences of High Fertility in Pakistan. World Bank Discussion Paper Series No. 111.
INSTITUTION World Bank, Washington, D. C.
REPORT NO ISBN-0-8213-1726-1
PUB DATE 90
NOTE 58p.
AVAILABLE FROM Publications Sales Unit, Department F, The World Bank, 1818 H Street, NW, Washington, DC 20433 ($15.95).
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Birth Rate; *Developing Nations; Economic Factors; *Educational Opportunities; *Equal Opportunities (Jobs); *Family (Sociological Unit); Family Size; Females; Foreign Countries; Living Standards; Males; Population Trends; Public Health; Rural Urban Differences; Sex Differences
IDENTIFIERS Fertility; *Pakistan

ABSTRACT

The theory and evidence of the consequences of high fertility in Pakistan are reviewed in this paper. Several data sets are analyzed to examine the effects of the number of children on school participation and labor participation in urban Pakistan. Other data are utilized to examine the effects of children on savings in urban and rural areas. Results show that the number of children negatively affects the schooling of girls, but not boys. The number of boys and girls in the household have differential effects on women's labor participation while female children, but not males, affect adult male's participation. Children, ages 6-15, have negative effects on rural savings, but less effect in urban areas. In general, the effects of high fertility for households in Pakistan seem more negative than in many countries. This may explain the high proportion of women who say they want no more children. Why so few of these women use contraception is more difficult to explain. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SO

ED332913

111

World Bank Discussion Papers

Household Consequences of High Fertility in Pakistan

Susan Cochrane,
Valerie Kozel, and
Harold Alderman

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

J.
FEATHER

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SO 021 313

BEST COPY AVAILABLE

Recent World Bank Discussion Paper

No. 52 *The Market-Based Menu Approach in Action: The 1988 Brazil Financing Package*. F

No. 53 *Pathways to Change: Improving the Quality of Education in Developing Countries*. A

No. 54 *Education Managers for Business and Government*. Samuel Paul, Jacob Levitsky, an

No. 55 *Subsidies and Countervailing Measures: Critical Issues for the Uruguay Round*. Bela Balassa, editor

No. 56 *Managing Public Expenditure: An Evolving World Bank Perspective*. Robert M. Lacey

No. 57 *The Management of Common Property Natural Resources*. Daniel W. Bromley and Michael M. Cernea

No. 58 *Making the Poor Creditworthy: A Case Study of the Integrated Rural Development Program in India*. Robert Pulley

No. 59 *Improving Family Planning, Health, and Nutrition Outreach in India: Experience from Some World Bank-Assisted Programs*. Richard Heaver

No. 60 *Fighting Malnutrition: Evaluation of Brazilian Food and Nutrition Programs*. Philip Musgrove

No. 61 *Staying in the Loop: International Alliances for Sharing Technology*. Ashoka Mody

No. 62 *Do Caribbean Exporters Pay Higher Freight Costs?* Alexander J. Yeats

No. 63 *Developing Economies in Transition. Volume I: General Topics*. F. Desmond McCarthy, editor

No. 64 *Developing Economies in Transition. Volume II: Country Studies*. F. Desmond McCarthy, editor

No. 65 *Developing Economies in Transition. Volume III: Country Studies*. F. Desmond McCarthy, editor

No. 66 *Illustrative Effects of Voluntary Debt and Debt Service Reduction Operations*. Ruben Lamdany and John M. Underwood

No. 67 *Deregulation of Shipping: What Is to Be Learned from Chile*. Esra Bennathan with Luis Escobar and George Panagakos

No. 68 *Public Sector Pay and Employment Reform: A Review of World Bank Experience*. Barbara Nunberg

No. 69 *A Multilevel Model of School Effectiveness in a Developing Country*. Marlaine E. Lockheed and Nicholas T. Longford

No. 70 *User Groups as Producers in Participatory Afforestation Strategies*. Michael M. Cernea

No. 71 *How Adjustment Programs Can Help the Poor: The World Bank's Experience*. Helena Ribe, Soniya Carvalho, Robert Liebenthal, Peter Nicholas, and Elaine Zuckerman

No. 72 *Export Catalysts in Low-Income Countries: A Review of Eleven Success Stories*. Yung Whee Rhee and Therese Belot

No. 73 *Information Systems and Basic Statistics in Sub-Saharan Africa: A Review and Strategy for Improvement*. Ramesh Chander

No. 74 *Costs and Benefits of Rent Control in Kumasi, Ghana*. Stephen Malpezzi, A. Graham Tipple, and Kenneth G. Willis

No. 75 *Ecuador's Amazon Region: Development Issues and Options*. James F. Hicks, Herman E. Daly, Shelton H. Davis, and Maria de Lourdes de Freitas [Also available in Spanish (75S)]

No. 76 *Debt Equity Conversion Analysis: A Case Study of the Philippine Program*. John D. Shilling, Anthony Toft, and Woonki Sung

No. 77 *Higher Education in Latin America: Issues of Efficiency and Equity*. Donald R. Winkler

No. 78 *The Greenhouse Effect: Implications for Economic Development*. Erik Arrhenius and Thomas W. Waltz

No. 79 *Analyzing Taxes on Business Income with the Marginal Effective Tax Rate Model*. David Dunn and Anthony Pellechio

(Continued on the inside back cover.)

BEST COPY AVAILABLE

World Bank Discussion Papers

Household Consequences of High Fertility in Pakistan

Susan Cochrane,
Valerie Kozel, and
Harold Alderman

The World Bank
Washington, D.C.

4

Copyright © 1990
The International Bank for Reconstruction
and Development/THE WORLD BANK
1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

All rights reserved
Manufactured in the United States of America
First printing December 1990

Discussion Papers present results of country analysis or research that is circulated to encourage discussion and comment within the development community. To present these results with the least possible delay, the typescript of this paper has not been prepared in accordance with the procedures appropriate to formal printed texts, and the World Bank accepts no responsibility for errors.

The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent. The World Bank does not guarantee the accuracy of the data included in this publication and accepts no responsibility whatsoever for any consequence of their use. Any maps that accompany the text have been prepared solely for the convenience of readers; the designations and presentation of material in them do not imply the expression of any opinion whatsoever on the part of the World Bank, its affiliates, or its Board or member countries concerning the legal status of any country, territory, city, or area or of the authorities thereof or concerning the delimitation of its boundaries or its national affiliation.

The material in this publication is copyrighted. Requests for permission to reproduce portions of it should be sent to Director, Publications Department, at the address shown in the copyright notice above. The World Bank encourages dissemination of its work and will normally give permission promptly and, when the reproduction is for noncommercial purposes, without asking a fee. Permission to photocopy portions for classroom use is not required, though notification of such use having been made will be appreciated.

The complete backlist of publications from the World Bank is shown in the annual *Index of Publications*, which contains an alphabetical title list (with full ordering information) and indexes of subjects, authors, and countries and regions. The latest edition is available free of charge from the Publications Sales Unit, Department F, The World Bank, 1818 H Street, N.W., Washington, D.C. 20433, U.S.A., or from Publications, The World Bank, 66, avenue d'Iéna, 75116 Paris, France.

ISSN: 0259-210X

Susan Cochrane is principal population economist in the World Bank's Population and Human Resources Department, to which Valerie Kozel is a consultant. Harold Alderman, a research fellow at the International Food Policy Research Institute, is also a consultant to this department.

Library of Congress Cataloging-in-Publication Data

Cochrane, Susan Hill, 1943-
Household consequences of high fertility in Pakistan / Susan H. Cochrane, Valerie Kozel, Harold Alderman.
p. cm. -- (World Bank discussion papers ; 111)
ISBN 0-8213-1726-1
1. Fertility, Human--Pakistan. 2. Households--Pakistan. I. Kozel, Valerie, 1952- . II. Alderman, Harold, 1948- . III. Title. IV. Series.
HB1050.5.A3C63 1990
304.6'32'095491--dc20 90-22877
CIP

This paper reviews the theory and evidence on the consequences of high fertility in Pakistan. In addition, several data sets are analyzed to examine the effects of number of children on school participation and labor participation of men, women and children in urban Pakistan. Another data set is utilized to examine the effects of children on savings in urban and rural areas. Results show that the number of children negatively affects schooling of girls, but not boys. Number of boys and girls in the household have differential effects of women's labor participation while female children, but not males, affect adult male's participation. Children 6-15 have negative effects on rural savings, but less effect in urban areas. In general, the effects of high fertility for household's in Pakistan seem more negative than in many countries. This may explain the high proportion of women who say they want no more children. Why so few of these women do use contraceptive is more difficult to explain.

Table of Contents

Introduction 1

The Expected Consequences of High Fertility 1

The Health Consequences of High Fertility 5

The Effects of High Fertility on Child Quality 8

The Effects of Children on Family Labor Supply 10

The Effect of Fertility on Income 15

The Effect of Children on Savings 16

Implications 18

"I think, dearest Uncle, that you cannot <u>really</u> wish me to be the 'mamma d'une nombreuse famille,' for I think you will see the great inconvenience a <u>large</u> family would be to us all, and particularly to the country, independent of the hardship and inconvenience to myself; men never think, at least seldom think, what a hard task it is for us women to go through this <u>very often</u>." Queen Victoria to King Leopold

There are two reasons for examining the 'consequences' of high fertility for families. The first is to understand the motivations to have large numbers of children by examining their costs and benefits to families. The second is to understand the implications of high fertility for the macro economy. For example, the household's decisions on savings have macro implications for availability of private savings. Likewise, household decisions with respect to fertility and schooling have implications for public expenditures for education and, thus, for public savings. In the present paper, we shall review the existing evidence on the household consequences of high fertility in developing countries with special reference to Pakistan and analyze household data from two Pakistani surveys. This paper will examine both the health and economic consequences of high fertility. It is the only study in the literature that uses data from a single country to look at such a broad range of consequences and, thus, provides a rich picture of the relationship between number of children and household welfare.

The paper is presented in seven parts. The first part presents a summary of the hypotheses about the effect of high fertility on the household and a summary of the evidence on those findings. The second part reviews the evidence on the health consequences. The third part reviews the consequences for child quality, particularly schooling. The fourth part reviews the effect of children on family labor supply while the fifth part reviews their effect on income. Their effect on savings are reviewed in the sixth section. The final section presents the policy implications of the findings.

The Expected Consequences of High Fertility

There are several dimensions of high fertility that are believed to have negative consequences for the health of mothers and children and for the investment in the health and education of children. Household fertility is also believed to have consequences for the economic well-being of the family. These consequences may be positive or negative. It is generally

hypothesized that it is the positive consequences of high fertility that motivate families to want large numbers of children. The economic consequences of high fertility are those on family labor supply, income and savings and investment in schooling. The hypothesized direction of the various relationships and the evidence that has been found from a variety of studies throughout the developing world are summarized in Table 1. The hypothesized consequences for the mortality and morbidity of women and children are all negative. These negative effects on mortality are well documented with data from developing countries, but given the rarer occurrence of maternal mortality, the evidence is weaker than that for infant and child mortality. The data on maternal and child health (morbidity and nutritional status) and its relationship to fertility are rarer yet.

The economic consequences have a more mixed set of hypotheses. There is a general expectation that high fertility will reduce the school participation of children. The world-wide evidence is mixed for urban areas and generally not confirmed for rural areas. Only when negative trade-offs do exist will there be a motive to reduce fertility to improve child quality. The effects of children on labor supply differ depending on whose labor is in question. The direct effect of children by supplying their own labor is positive, but the magnitude differs enormously from place to place. There appears to be a much lower labor participation rate for children in areas where fertility is low. It is generally hypothesized that high fertility has a negative effect on female labor participation, but the international evidence has been mixed. Particularly in rural areas, this relationship has not been confirmed. The effect of fertility on the labor supply of adult males has been little studied, either theoretically or empirically. For this reason, it is difficult to determine the total effect of high fertility on household labor supply and thus on family income.

Though the effect of high fertility on income may be positive or negative, it is believed that the positive effect of children on income is more than offset by their effect on consumption. Thus, it is hypothesized that high fertility has a negative effect on savings. In addition, it is generally hypothesized that children are used as a substitute for financial savings by providing old age support. The international evidence from developing countries, however, has not confirmed a systematic relationship between fertility and savings.

The mixed nature of the findings in the literature probably reflects both the highly variable methodologies and samples used as well as very real differences in high fertility's consequences from place to place and time to time. There are several issues of methodology. First, one reason that the evidence tends to be mixed is that the number of children has often been found to be

less important than age structure effects. Both the age of the head of household and thus his place in his career and the ages of children make an enormous difference in the economic behavior of the household, labor supply, income, consumption and savings patterns. For this reason we have consistently used the number of children of various ages in the analysis of the Pakistan data.

Second, as King (1987) points out, the "consequences" of high fertility must be placed within a theoretical context. Household fertility behavior is closely linked to investments in health and education, labor supply and savings behavior. Given the simultaneous nature of these household decisions, it is more appropriate to use the term trade-off than to use the term consequences. The models linking fertility determination and household welfare range from the simple to the highly complex. The simplest of these formulation is made implicit in the work of Malthus (1798): he hypothesized a trade-off made between the level of living and marriage and procreation. More complex models have incorporated trade-offs between the quantity and quality of children (Becker (1960) and Becker and Lewis (1971)), the trade-off between present and future consumption (Neher (1971)) and the trade-offs between female earnings and fertility (Becker (1965) and Willis (1973)).[1] These modern models that have come to be referred to as the "New Home Economics" provide extremely valuable insight into the determinants and consequences of fertility behavior. These models imply that one can not estimate trade-offs between fertility and other dimensions of household behavior or of family welfare without estimating a simultaneous set of equations. These models of fertility determination assume that there exists perfect knowledge, perfect foresight and perfect/costless control of fertility. While the first two assumptions are always problematic, the assumption of perfect and costless control of fertility is particularly problematic in Pakistan at the current time and even more so in the past.

Despite a concern about population pressures by the Government of Pakistan since the mid-1960s, little progress has been made in the delivery of services. At the time of The World Fertility Survey in 1975, 43% of the women wanted no more children, but very few were using contraceptives[2]. Estimates of

---

[1] These various models have been reviewed by Cochrane (1975), T.P. Schultz (1973), T.W. Schultz (1973) and Nerlove (1973). These models have also received a fair share of criticism from within and outside the economics profession. (See Cochrane (1975) for a review of the criticism of the literature up to that point.)

[2] Currently less than 10% of the married, non-pregnant women of reproductive age were contracepting. Although the family planning program was one of the first ones created in a developing

unmet need for contraception made for data from 39 developing countries showed that Pakistan had the highest level of unmet need (U.N. 1987, p. 141). Further evidence shows that 28% of the fertility in Pakistan was reported to be unwanted by the mothers[3] (U.N. 1987, p. 69). Another factor that violates the assumptions necessary to assume that the current level of children in the household is endogenously determined is the very high level of infant and child mortality. Finally, as will be shown below, the sex of the child makes an important difference in their economic consequences. Sex of children can only be controlled through selective strategies of child neglect. These may well exist, but can not be modeled with the existing data sets. Thus, particularly, in Pakistan at this time we do not feel that a simultaneous model of fertility needs to be estimated to obtain trade-offs between number of children and various dimensions of family welfare. There is only one case in which the lack of a simultaneous model may do damage to our findings and this is the link between number of children and income. Here the link is not through fertility, however, but through child survival. This possibility will be borne in mind in interpreting the findings, since it is not possible to model fertility or mortality given the nature of the data.

Third, there are very few data sets which include data on both fertility and other dimensions of family welfare. Of the many fertility surveys, few have data on labor and school participation, much less data on income and savings. Household income/expenditure and labor force surveys rarely have fertility data, but rather only have data on the age and sex of living household members[4]. This is true of the data sets analyzed in the present paper. The data sets that are available to us for new analysis are the Pakistan Institute of Development Economics/International Food Policy Research Institutes survey of

---

country (1965), it can only be judged a failure. An analysis of that failure is beyond the scope of this review. The main ingredients, however, have been the low literacy levels, low status of women as well as both a lack of resources and committment to the program and frequent changes in its structure. (See Robinson et. al. (1981) for a review.)

[3] There has only been one fairly small survey of husbands in recent years. This showed that husbands' preferences for children were about the same as wives'. (Sotoudeh-Zand (1987))

[4] This use of number, age and sex of household members instead of the number of births and deaths to specific women in the household is the main reason that a simultaneous model can not be estimated.

1,000 households in low income urban areas in Pakistan[5] and the National Household Income Expenditure Survey of 16,000 households in Pakistan conducted by the Federal Bureau of Statistics in 1979.

Despite the problems of methodology and data availability, it is still possible to obtain insight into the trade-offs between the number of children in Pakistani families and their welfare. The evidence to be reviewed confirms the effects of high fertility on infant and child mortality and shows negative effects of children on the school participation of urban children, especially girls. The effect of children on family labor supply differs depending on the sex of the adult and the child. Male children have a direct positive effect through the supply of their own labor, but do not stimulate the labor supply of their siblings in urban areas. Children do have a positive effect on the labor supply of adult males in urban areas. Young children have no effect on the labor supply of urban women, but girls 7-14 have a positive effect on the labor supply of these women while boys of those ages reduce that labor supply. This probably results from the fact that girls substitute for women at home while boys substitute for them in the labor market. Because of these labor supply effects, children are associated with higher total family income, but they are associated with lower per capita income[6]. The fact that children's effects on income are less than their effects on consumption, is revealed by the fact that are associated with lower family savings, especially in rural areas. Thus, the evidence of this study is consistent with the existing literature, but provide a richer picture of effects than is found in other studies which generally focus on only one dimension of the consequences of high fertility. Our findings and those of others are documented in detail in the following sections.

The Health Consequences of High Fertility

High fertility has serious effects on the health and survival of mothers and children. Morbidity data are rare, but infant and child mortality are fairly well documented. Three aspects of fertility behavior are believed to be detrimental to maternal and child health. First, large numbers of children are believed to have negative consequences for women and children. Second, the birth of children at the extremes of the child

---

[5] Throughout the paper this will be referred to as the PIDE/IFPRI data set.

[6] This would appear to support the argument that children affect income rather than the converse one that higher income increases fertility or lowers mortality.

bearing age (under 20 and over 35) have negative consequences. Third, the close spacing of births has negative consequences. In addition, it is believed that unwanted births are at higher risk as are the mothers of those births due either to crudely induced abortions, or neglect. These are not strictly medical consequences but represent choices.

The effects of high fertility on infant and child mortality have been well documented as a consequence of the WFS for a wide variety of developing countries and for Pakistan specifically. (Hobcraft et al., 1985). Table 2 summarizes the findings. In Pakistan, if a child was born within 2 years of another child that lived, it had a 30% higher chance of dying in the first month of life , a 60% higher chance of dying in the remainder of the first year and a 50% higher chance of dying between ages of 1 and 5 than if there had been no other child born. If a previous child had been born in that two year period and died, the mortality risk of the subsequent child would have been dramatically higher. If there had been two other children born in the previous two years, the mortality risk during the first year of life would be much greater than if there had been only one living child or no children. In the ages 1 to 5, there is not as consistent an increase with two rather than one child born in the previous two years. The child spacing effects are well illustrated in Figure 1 which shows mortality rates by length of the preceding interval if the preceding child survived.

The effects of birth order (not family size) and age of mother are less clear. To interpret these results, it is useful to divide the periods. Biological factors are more important in the first year of life while for toddler and child mortality, environmental (social and economic) factors are more important. Thus, we find in Pakistan first births are disadvantaged in the first year of life, having mortality almost twice as high as that of second and third births in the second through twelfth month of life. After that stage, first births have 20% lower mortality. Children of birth orders of 4 or above have a very slight advantage over second and third children in the first year of life, but have 30 to 40% higher mortality in the second year. Mothers under 20 show a much higher mortality for their children in all age groups except the post-neonatal period than do women 25 to 34. Children of women over 35 in Pakistan show no disadvantage in the first year of life and a mixed pattern in the 1 to 5 ages. It should also be noted after the initial biological advantage that female infants have over male infants, female children have substantially higher mortality in Pakistan (20 to 40%).

An analysis of the high levels of infant mortality in Pakistan (Sathar, 1987) indicates that although urban/rural residence, household income and maternal education are significant in explaining high mortality, the childbearing

patterns of close spacing and births at the extreme ages are far more important. This is confirmed by evidence on Pakistan that show the effect of spacing on child survival "...are equally strong for rural and urban families, for children of uneducated and educated mothers, for boys and girls and for large and small families" (Cleland and Sathar (1984), p. 416).

Although maternal mortality is known to be high in Pakistan (600 per 100,000 compared with 145 for the average middle income country), data on maternal mortality differentials by fertility are rarer than such data for infant and child mortality. We have not located any studies specific to Pakistan, but several studies on Bangladesh are available which provide insight into the effects of parity and maternal age on maternal mortality. (See Winikoff and Sullivan (1987) where findings from Bangladesh, Nigeria and Sweden are summarized. Two of the three Bangladesh studies show that higher parity women account for a substantially higher portion of the maternal deaths than of births[7]. The Winikoff and Sullivan study estimated the effect on maternal mortality of fertility. They show that eliminating births to women under 20 and over 34 would avert 52% of the maternal deaths and 30% of all births. Eliminating all births above the fifth would reduce maternal mortality by a third and reduce births by 14%. Estimates have also been made under varying assumptions of the effects of eliminating unwanted fertility. For Pakistan, a study by Deborah Maine (1985) estimated that if all unwanted births were prevented, 40% of the maternal deaths could be averted. Pakistan was the country most significantly affected of the 12 countries studied because of the combination of high maternal mortality and high unwanted fertility. There are also important effects of high fertility on maternal morbidity, but these effects are less well documented. A recent paper by Winikoff and Castle (1987) indicates that evidence on the effect of high fertility on the maternal depletion syndrome probably depends very heavily on the economic circumstances of the household and the burden of physical work. While no data on maternal mortality nor morbidity are available for Pakistan, the Department of Community Medicine of The Aga Khan University in Karachi is proposing a prospective survey of 10,000 pregnant

---

[7] A Khan et al. (1986) study shows the risk is more than twice as high for parities of 5 or more compared for lower parity. This is also true for women with parities of 6 or more in the Alauddin (1986) study. The Chen study as cited in Winikoff and Sullivan does not show higher risks for higher parity women. The original article (Chen et al., 1974), shows that although the relationship is not perfectly monotonic, women have the lowest mortality for their second and third births followed by their fourth and fifth, sixth and seventh, etc. When age and parity are combined the Alauddin study shows substantially higher risks for older, higher parity women than others.

women which would help establish the level and correlates of maternal mortality and morbidity.

The Effects of High Fertility on Child Quality

The health and education of children are of importance to the parents, the children themselves and to society since these factors determine the productivity of the next generation. In the "New Household Economics" it is hypothesized that parents choose the family size they want at the same time that they decide the quality of the children they wish to have, i.e. the amount that they wish to invest in child health and education. The theory, however, is generally interpreted to imply that households must make trade-offs between high fertility and per child investments in health and education. Therefore, child health and education would be lower in large families. Except for the evidence cited above that fertility has observed effects on mortality, there is little evidence on the association between child health and family size either world wide or for Pakistan. A recent study by Alderman et al. (1988), however, which analyzed a sample of low income urban neighborhoods in Pakistan, showed that children in households with a larger share of children under 5 had significantly lower weight for height relative to international standards. Nutritional status in that study was not significantly related to family size per se, but was positively related to household per capita expenditures. Thus, if high fertility reduced those expenditures, it would have a negative nutritional effect. An earlier study of about 1,000 children in the urban slums of Karachi showed mixed effects of high fertility. Family size was positively related to one dimension of child nutritional status; child spacing (of living children) had no significant effect; and parity had significantly negative effects on red blood cell count. The most significant demographic factor was length of breastfeeding which had significantly positive effects on three of the seven measures of nutritional status (Qureshi, 1982).

The New Household Economics predicts negative correlations between family size and investment in a child's education. There have been several literature reviews that have addressed this question. Jee Peng Tan and Michael Haines (1984) tend to support the findings of an earlier paper by Mueller (1983). "....the Becker type quantity/quality trade-off applies more to industrial societies than to low income, rural, agrarian developing groups or regions. When education is extensive and prolonged, and when incomes are high, the negative trade-off can be found (e.g. DeTray, 1978). But in less developed rural areas, the relation may be only weakly negative, zero or even positive. The same conclusion was also reached in a study by Birdsall and Cochrane (1982)" (Tan and Haines, 1984, p. 15). A recent study of Egypt

tends to confirm this as well (Cochrane et al, 1986)[8]. Analysis of data from rural Botswana showed that the presence of an infant significantly reduced school participation while the presence of another child 7 to 14 in the household significantly increased the probability that a child was in school controlling for the education of household head, landownership and value of livestock owned[9] (Chernichovsky, 1985). On the other hand, a study in rural northern Thailand where fertility had been declining rapidly showed that while younger siblings had no effect on the schooling of those 6 to 14, they did have a significantly negative effect on the participation and years completed of those 15 to 25 (Cochrane and Jamison, 1982).

Evidence from Pakistan on this topic is rare. A study of Punjabi men and women (data collected for the Asia Study of Marriage) showed that when the number of siblings a person had was predicted (determined simultaneously), it was never significantly negatively related to years of school completed, but was significantly positively related for middle class urban females and rural males (King et al., 1986). This is, of course, counter to the hypothesized relationship. Thus, for the current adults in the Punjab, the number of siblings did not constrain their educational achievement[10]. Whether this pattern persists among the current generation of children is less certain.

For children in Pakistan, the PIDE/IFPRI urban sample shows that the number of children of various ages in the household has differential effects on the participation of male and female children in school (See Tables 3 and 4). The number of children under 5 has a significantly negative effect on the participation of girls, but not of boys. The number of children 5 to 14 has no significant effect for either[11]. The presense of one child under

---

[8] There the number of children in the household under 13 was negatively related to years of school attended for 3 of 4 age sex groups (no effect on males 15 to 25) in urban areas, but showed no association in rural areas.

[9] It was hypothesized by the author that this effect arose from the fact that when there were more children in the family, there was less opportunity for each additional child to work. This then freed up time for school participation.

[10] These findings were confirmed for Indonesia and the Philippines where the only significant associations were positive. (King et al.(1986)).

[11] When the highest education of a female in the household was added to the equation, the results for children under 5 was confirmed, but the number of children 5 to 9 had a significantly negative effect for boys and girls, but the effect was stronger and

5 would reduce the participation rate for girls aged 5 to 20 from 41% to 35% and the rate for boys from 65% to 51%. These effects probably reflect in part the fact that female children are given the responsibility for the care of younger siblings and this pulls them out of school. This is partially confirmed by the finding that the more adult women there are in the household, the more likely girls are to participate in school. The education of daughters has been found in many countries to be more sensitive to the economic conditions of the household than is the education of sons (Bowman and Anderson, (1982). It should be noted, however, that here the effects of family expenditure, a proxy for income, affects males and females to a similar degree[12].

The Effect of Children on Family Labor Supply

The debate on the motives for high fertility centers around the economic contribution of children. Child labor, like that of women, is more difficult to measure than that of men since it is more likely to be in household enterprises rather than in employment for others or the formal sector[13]. Thus, it is difficult to have a precise estimate of the effect of the economic contribution of children[14]. Table 5 shows the

---

more persistent for girls.

[12] For the 1567 females and the 1,665 males (5 to 20) the PIDE/IFPRI data show that several factors are consistently significant for both males and females: age has nonlinear effects with participation first increasing and then decreasing with age; household expenditures have significant positive effects on school participation; household participation in a family enterprise or self employment significantly reduces school participation; and education of the head of household of primary school and above significantly increases participation of children and this effect becomes greater the higher the head's level of education. When the highest level of female education is included in the analysis, it is found to have strong positive effects on participation, but this variable enhances rather than reduces the effect of number of children on school participation. Other variables have different effects for male and female children. Pathans are significantly more likely to educate their sons and significantly less likely to educate their daughters.

[13] Estimates in 1975 indicated that 80% of the children working world-wide were unpaid family workers. Tan and Haines, 1984, p. 58.

[14] The recent report on employment issues in Pakistan cites evidence from Yotopoulos and Nugent (1976) that 6.5% of males 0 to 14 work in developing countries while 4% of females do. At the

participation of children 10 to 14 for various years in Pakistan and comparable figures for other developing countries. Pakistan's figures are substantially above those found for the same period in Egypt, where only 20% of the males and 6% of the females 10 to 14 worked, and substantially above that found in two states of India in the early 1970's. Even though urban participation rates are much below those in rural areas, urban rates in Pakistan are above national rates in Sri Lanka and Taiwan in the late 1960s and early 1970s [15]. Labor participation of male children in Pakistan is closer to that found in urban areas in Nepal and in rural areas of Africa (Ivory Coast and Botswana). The very sharp differences between the participation of male and female children are greater than elsewhere. Only in rural Botswana are they approximated. This undoubtedly partly explains the very strong preferences for male children found in Pakistan. Rosenzwieg and Schultz (1982) found that male/female mortality differentials in rural India were affected by wages of male and female children. This represents an extreme manifestation of the preference for male children.

The effect of children on income depends on the amount they work and their rate of remuneration. The hours worked by children are not immediately available from any national survey in Pakistan. Data from a variety of rural areas in other developing countries indicate a variety of patterns. Cain's study of Bangladesh showed children 4 to 6 worked one-fifth as long as adults, increasing to one-half by ages 7 to 9 and three-fourths at ages 10 to 12 and increasing to adult level thereafter (Cain, 1979). On the other hand, Hart's study of rice growing areas in Indonesia showed that the contribution to work of children 6 to 9 was negligible. Those 10 to 15 worked 40 to 60% of adults. The Malaysia Family Life Survey (De Tray, 1983) found substantial ethnic and gender difference in work.

Data on the rate of remuneration of children for their work are even rarer than that for hours worked. Data from rural Egypt in the early 1960's showed the child wage to be 50% of the adult wage. Earnings per hour in Egypt in 1980 showed male children 6 to 14 earned about one-third of all males while those 15 to 19 earned two-thirds (Hallouda et al., 1983). Combining data on proportion working, hours worked, and earnings per hour, one could estimate the economic contribution of children. Alternatively one could estimate the earnings directly. King and Evenson (1983) found in the rural Philippines "...that children contribute about one-fifth of the family's market income and one-third of the value of home production..." (King, 1987).

---

ages of 15 to 24 the respective figures are 78% and 37%.

[15] Taiwan and Sri Lanka were undergoing substantial fertility decline at that point.

The above data help to bracket the probable contribution of children in Pakistan to family labor supply and income. Major questions that needs to be answered are what factors tend to determine the labor participation of children in Pakistan and whether large family sizes make it more likely that a child will work. The evidence of the effect of the number of children on the participation of other children in the family is summarized by Tan and Haines. They state, "At this point, the available data provide no convincing evidence either for a negative or positive relationship between number of siblings and work per child" (p. 62).[16]

We have found no study that provides insights on this question for Pakistan. It has been possible, however, to analyze the PIDE/IFPRI urban sample to explore these determinants. Table 6 shows the result of an analysis of males 10 to 14. A boy's labor participation increases significantly with his age and decreases significantly with his father's education. No other factor is significant. Thus, the number of young children had no effect on the labor participation of other children in the household in urban Pakistan, but children do contribute to income.

In addition to the direct effects of children on income through their own contribution, there are also the effects that children have on the labor contribution of adults in the household. The effect that has received the most attention in the literature is the effect of family size on the contribution of women to household income. There are a number of problems associated with trying to disentangle these effects: (1) measurement problems arise because female labor participation tends to be underreported and (2) labor force participation affects fertility as well as the converse. Therefore, it is important to establish the appropriate specification of the model. One useful way of framing the question is to recognize that labor participation in previous years partly determines fertility while current labor participation is affected by past fertility. (See Standing, 1983.) In addition, children both pull women from the labor force by demanding their time at home and push them into the labor force to obtain income. Unless the earnings of others in the household are incorporated in the analysis to control for the push factor, the interpretations are likely to be confused. For a country like Pakistan, the analysis of these relationships is made even more difficult by the very low levels of reported labor market participation of women.

---

[16] See Nag et al.,(1980), Mueller, (1981), and de Tray, (1983) for analysis for Nepal and Java, Botswana, and Malaysia, respectively.

The consensus of the evidence in developing countries on the effect of fertility on female labor participation was summarized by Standing in the National Academy of Sciences review, "In nonindustrialized, low-income environments, women's involvement in productive activity will have little relationship to fertility at the macro level; as industrialization and the growth of wage employment spread, an inverse relationship will become more likely...." (p. 533)[17].

Data from the Pakistan Impact Survey of 1968-69 showed that for OLS equations in rural, but not urban areas, the total number of live births to women 35-49 who wanted no more children was a significantly negative factor in explaining whether the woman had ever participated in the labor force. This effect disappeared when two stage least squares was used. However, if a woman had participated in the labor force she had significantly higher fertility in the two stage least squares, but there was no effect in the ordinary least squares (Khan and Sirageldin, 1979). In urban areas there was no significant relationship in either specification. The PIDE/IFPRI data set of urban households allows the analysis of the factors affecting female labor participation. Table 7 reports on the findings. According to these results, a woman's age, schooling of secondary level or above and residence in the Punjab all had a significantly positive effect on her labor participation. Rather surprisingly, the predicted wage of the household head had no effect. The demographic composition of the household had significant effects. While children under 7 had no significant effect, older household members had different significant effects depending on their sex. Males 7 to 14 or over 14 significantly reduced the participation of a woman since, presumabl, this meant there were alternative sources of income to the household. Females 7 to 14 and over 14 significantly increased the labor participation of a woman, presumably by reducing the demands on the woman's time for home production. The magnitude of these household composition effects are, however, small. At the two extremes, only 1% of the women with two children under 6 and 3 adult males in the household would work in economic activity while 12% of the women with 4 children (2 under 7 and a male and female 7-14) and no males in the household would work. The effect of the presence of adult males in the household is a much more important factor in determining labor participation than is the presence of children[18].

---

[17] Evidence from Sri Lanka (Sahn and Alderman, forthcoming) and Egypt (Cochrane and Yazbeck, in draft) confirm this finding.

[18] The elasticity for adult males is .53 compared to .09 for children under 7.

In support of our findings, a study of the rural Punjab showed that the number of children in the household had no significant effect on the labor participation of women in either landed or landless households. (Khaliqzzaman, (1987)) It did show, however, that the average education of women in the household had a significantly positive effect on the labor supply.

The relationship between adult male labor supply and fertility has not been extensively studied. King (1987) has reviewed the little evidence available. The one study of a developing country, the Philippines, showed that male labor supply was significantly increased by the presence of children under 15. When the age structure of those children was controlled the effects turned out to be small, 20 minutes a day (King and Evenson, 1983). Although the theory has not been well developed, specialization within the household suggests that the presence of children would lead to husbands working more in the market to compensate for the wife working less. In general, there often appears a positive relationship between family size and male labor supply in the few studies where it has been analyzed[19].

We have analyzed data from the urban PIDE/IFPRI sample using an estimate of the predicted wages of the male to correct for selection bias. The estimated wage equation and the labor supply equations are presented in Appendix Tables 1 through 3. The predicted wage has a significantly positive effect on labor supply and the income of other household members has a significantly negative effect on labor supply as would be expected. While children under 7 have no significant effects for either group, the effects of other groups in the household tend to differ depending on whether a male is an employee or whether he is self-employed. For employees and the self-employed, the number of females 7 to 14 has a significantly positive effect on labor supply as does the number of adult males. For the self-employed, the number of males 7 to 14 and the number of adult females also have a significantly positive effect.[20]

---

[19] This is confirmed in a study of Egypt (Cochrane and Yazbeck, in draft), but not confirmed in Sri Lanka (Sahn and Alderman, forthcoming).

[20] These effects are controlled, however, for the income of other household members. The correct specification would be a simultaneous tobit model with an instrument variable, but such specifications are extremely difficult to estimate. An alternative is to estimate the same equation leaving out the income earned by others and compare the results to those found previously. To the extent the findings correspond, the specification problems are minimal. Appendix Table 3 shows the results of such an analysis.

Table 8 summarizes the effect of additional family members of various age and sex combinations. These effects are additive. Thus, an additional 8 year old girl adds 1.73 hours per week to male labor in one specification and the addition of a 5-year-old brother or sister would add another 1.09 hours. Except for children under 7 in one specification, the addition of persons of any kind increases the labor supply of males. In general, the effects are much greater among self employed men where there is more latitude to adjust one's hours and these effects are larger where the income of other household members is not held constant. With an average work week of 52.6 hours, additional work of between 1 and 5 hours is supplied. A man with a wife and 4 children (one male and one female under 7 and one male and one female 7 to 14) would work between 6 and 15 additional hours more than a single man (depending on the specification: about 6 hours more in the wage sector and 15 in the self-employment sector).

The Effect of Fertility on Income

The effect of fertility on income is not well researched in the literature, but it is essential to understand this relationship, both for its own sake and to help understand the fertility-savings link. Using the 1979 Pakistan Household Income and Expenditure Survey (HIES), household earnings were found to be dependent on the age and education of the household head, and the age-sex composition of the household for various types of urban and rural households[21]. These results are shown in Appendix Tables 4 and 5. The number of adults in the household had positive and significant effects on earnings. The size of the effect of adult females tended to be much higher than one would expect given the low labor participation documented in the PIDE/IFPRI survey and other sources in Pakistan. This implies that either women's income contributions are greatly underestimated[22], that females have stronger effects on increasing male participation than documented above or that richer households attract or retain more adult women perhaps by delaying the marriage of their daughters. The associations between children and earnings are not significant in every sample, but are always positive and significant in the complete

---

The pattern of significance is little changed.

[21] These equations were estimated for the entire sample and for the lower 95% of the income distribution. The results were very similar. Those for the lower 95% are reported here.

[22] These is a substantial literature on the underreporting of female labor participation. Therefore, it would not be surprising if their direct contribution to income were underreported when asked for separately.

urban and the complete rural samples. The number of children under six is positively related to earnings. Since children of this age do not work, the effect either results from the effect of young children in stimulating labor supply of males or the effect of higher income on fertility and child survival. The association between older boys and girls differs greatly within the various groups in urban and rural areas, but when all urban groups are combined and all rural groups are combined, there is a significantly positive association between the number of children (males and females) and income. It is impossible to determine the direction of causation here, but the analysis of PIDE/IFRPI data on urban males showed significant positive associations between hours worked by males and the number of male and female children 7 to 14 for self employed males and under 6 and for females 7 to 14 for wage workers. These types of effects are more likely to represent causation from children to work and, thus, income rather than the converse. We do not have comparable evidence from rural areas, but since boys work much more in those areas the positive relationships with income of young boys is likely to be from the presence of boys to income rather than the converse.

The 1979 data show that in rural areas the average income is 143 rupees per month and that if a family had an additional child under 6 they would have an average 36 rupees more. A 10- to 14-year-old male would be associated with an another 78 rupees. These additional amounts are less than the average, so that the average would fall with these additions. The same pattern is observed in urban areas. However, there the effects of children of different ages are less regular, but in each case additional children reduce per capita income or earnings. Only adult males and females are associated with income additions higher than the average[23].

The Effect of Children on Savings

The effect of number of children on household savings is not well understood. Chernichovsky (1978) found mixed evidence. Hammer's 1985 review found that for developed countries "...children may have little impact on the amount of savings done by the household but may affect the timing of that savings. The timing of the savings can affect the aggregate effects of

---

[23] This general pattern is confirmed in data from cross tabulations from the 1984-85 Household Income Expenditure Survey. While the number of children is higher in households with higher total family income, it is lower in households with higher per capita income. This is a pattern found in a number of other developing countries. (See Birdsall and Griffin, 1987).

population growth but the size and the direction of this effect is not clear." (page,17). There have been few studies of fertility and savings at the household level in developing countries, however[24].

To attempt to estimate the effects of family size and composition on savings in Pakistan, a model was estimated using the 1979 Household Income Expenditure Survey in urban and rural areas. An earlier study had utilized the urban data only to estimate the effect of children on savings (Akhtar, 1982). That study found non-linear effects for those under 15. The level of household financial savings was negatively related to an additional child when both its effects on family size and the number of dependents were taken into consideration. When all savings, financial and plus educational expenditures (investment in human capital), are combined, the effect of another household member under 15 only reduced the level of family savings at more than 3 children.

Two procedures were used to estimate the effect of children on savings for urban and rural areas. First, household monthly savings was regressed on predicted household income (an estimate of permanent income) and residual income (a measure of transitory income), age and education of household head and the age and sex composition of the household. These results are shown in Appendix Tables 7 and 8. The coefficients of these equations are referred to as the direct effects of children on savings and are shown as such in Tables 9. These direct effects are all negative, but not always significant. These direct effects indicate that while average family savings in the urban areas is 60 rupees a month, a family with 5 dependent children in the various age sex groupings would have about 34 rupees less a month than a family with no children. In rural areas such a family would save 72 rupees a month less, compared with an average savings of only 22 rupees. Thus, they would have negative savings.

These direct effects overestimate the negative effect of children on savings to the extent that family income increases in response to children due either to adults working more or the children themselves making a contribution. We can not perfectly determine the effect of children on income given the simultaneous relationships. We can, however, get an upper limit on this effect by using the coefficients of the relationship between the presence of children of various ages and sexes and household income. The savings out of that additional income can be estimated by multiplying it by the coefficient of income in the equations (the marginal propensity to save). This added savings

---

[24] Kelley and Swartz (1978) and Kelley (1980) studied Kenya and found ambiguous results.

can be combined with the negative direct effects of children on savings to get the "total effect" of children on savings. The direct effect estimated from the savings equation overestimates the negative effect of children on savings while the total effect probably underestimates the negative effect to the extent it overestimates the positive effect of children on income.

Looking at the total effects of children on savings (Table 9), we find that while effects vary from group to group, for the total urban group the presence of a child 7 to 14 reduces savings by between 2 and 6 rupees a month (at a minimum), compared with average monthly savings of 60 rupees. Thus each child in this age group would reduce savings by between 3 and 10%. In rural areas, children under 15 reduce savings by between 5 and 7 rupees or 23 to 32%. All adults except rural women have positive effects on savings. On average, it takes a relatively short time, about 2 years, for an urban male to make up for the savings losses incurred because of him in childhood[25]. For urban women, it would take about seven years. In rural households, in contrast, the childhood savings losses are essentially not recouped for either boys or girls, given the magnitude of the early losses relative to the subsequent earnings and savings opportunities.

It is often assumed that children are a substitute for savings in that parents rely on children for their old age support. This is probably a very real and important aspect of fertility decision making in Pakistan. Unfortunately, there are no data on which we can establish the contribution of children to the support of the elderly in Pakistan, but the savings behavior observed above undoubtedly reflects these factors.

Implications

The above findings have general implications for obtaining social goals, the design of family planning programs and the prospects for fertility decline. The clearest effects of high fertility, both in Pakistan and in other developing countries, are those on maternal and child health. The effects on school participation, labor supply, income and savings are less well documented in general, but the evidence on Pakistan tells an interesting story.

The effects of high fertility are best documented with respect to infant and child mortality. Pakistan's relatively high infant and child mortality is partially explained by the close spacing of births and the large proportion of children born to women under 20. This has very important implications for the

---

[25] A 10% discount rate was used to obtain these estimates.

design of the family planning program. First, the Information, Education, and Communication (IEC) programs should give far more attention to the message of child spacing than is currently being done. The program should advertise the importance of child spacing for infant and child health. Second, it is necessary to give more attention to contraceptive techniques which are useful for spacing of children and for the postponement of the first births. The program's current emphasis on sterilization and IUD insertion is not wrong, but method mix should be broadened. The IUD is inadvisable for women who have never had children and thus will be of limited value in terms of restricting births to women under 20. The contraceptive pill is far more advisable for these women. The IUD and injections are both useful for child spacing, but the program should consider implants as well, since injections require a constant follow up mechanism that would only be possible in parts of Pakistan.

The effects of high parity per se on maternal and child health are most likely to exist for maternal mortality, which is very high in Pakistan. High parity has been found to be a major contributor to maternal mortality in other countries. Thus, reducing high parity effects would be of particular benefit for women. The current program method mix does provide methods for restricting these births, but the IEC message does not emphasize the health burden of high fertility to women. IEC messages are of substantial importance, not only for making women aware of these consequences which in many cases is unnecessary, but also for giving validity to their concerns among other family members.

Improved maternal and child health are important national goals in Pakistan. Improved educational participation and achievement are also high priority. High fertility has immediate and direct effects on maternal and child health, but the effects on education are somewhat lagged and less direct. Evidence from other developing countries indicates that the family's own high fertility does not generally have significant effects on the school participation of the children in that family in rural areas. Thus, negative effects emerge at the community level where more children mean that educational resources are more thinly spread and the resulting lower quality education discourages participation and continuation in school. In urban areas, the data from Pakistan and other countries indicate that this public effect of thinly spread resources is further compounded by the effect of higher fertility within the household on the participation of other children in the home. The presence of children under 5 significantly reduces the participation of girls, but not boys in Pakistan. Thus, the social goal of increasing the education of women is particularly threatened by high fertility rates.

The effect of high fertility on the supply of labor is one of the most highly debated areas in the economics of fertility.

It is frequently argued that parents have large numbers of children in order to have access to child labor. There are really two questions here. The first is whether child labor participation is in fact high. The second is the question of causation: do families have high fertility to have child labor or is child labor one way of coping with the high burden of high unwanted fertility?

The first question is the easiest to answer. Pakistan does show high levels of child labor participation, higher than in countries like Egypt or other South Asian countries such as India and Sri Lanka. Its pattern of child participation is quite similar to that found in other areas which have high fertility (several countries in Sub-Saharan Africa and Peru show similar patterns). This may imply motivation to keep fertility high. Evidence indicates, however, that even in the mid 1970's almost 50% of the women at all education levels wanted no more children. There are fewer data available on husband's preferences, but the one existing study shows that husbands' average desired family size was about the same as that of wives (Sotoudeh-Zand, 1987). Thus, while child labor may lead to somewhat higher levels of desired fertility than otherwise, it does not lead to desired fertility as high as current levels. This seems to imply that high child labor may be more of a coping mechanism rather than a force for continued high fertility.

The presence of children affects family labor supply, both directly through child labor and indirectly by affecting parental labor supply. The evidence from other countries is mixed on this topic. For Pakistan, the presence of children has no effect on female labor supply in rural areas and a mixed effect in urban areas.

The effects of children on the labor supply of adult males are, rather surprisingly, much stronger. In urban areas, the larger the number of children 7 to 14, the more a man works. Whether in fact men work more in order to have more children, or whether they are forced to work more to cope with high fertility, is unclear. It seems likely that males do feel the economic pressure of high fertility, at least in urban areas, which may imply that there is a strong motivation among these men to limit fertility. The recent success of the commercial distribution of condoms indicates that there is an untapped motivation among males for family limitation. The offering of male sterilization, at least on an experimental basis through a non-governmental organization (NGO), might represent another important increase in the range of methods available, but as a first step a fertility survey which solicited male opinion would be advisable.

The relationship between family fertility and labor supply seems generally positive when child labor and male labor's response to high fertility are combined. This seems to be

confirmed when one examines the relationship between income and the presence of children. In urban and rural areas, there are significantly positive associations between income and the number of household members and all age/sex groups. The direction of causation is, however, unclear. It is unclear whether the additional incomes are sufficient to cover the cost of additional members. The evidence on the relationship between savings and fertility in Pakistan does provide some insight. The evidence indicates that for the total urban and rural samples, the direct effect of more children of all age/sex combination on savings is negative and substantial. The net effect when one adds in the positive income association is still negative. This negative savings effect is greater in rural than urban areas. This is counter to what is generally expected, perhaps because in rural environments parents are more likely to use children as a substitute for savings. Although the direction of effect at the household level is somewhat clouded, it is clear that from the perspective of the economy as a whole, there is less monetized savings available from the private sector as a consequence of Pakistan's high fertility.

Several important negative effects of high fertility on family well-being have been documented for Pakistan. Some of these are well known to families and probably explain the fact that a large proportion of women do not want additional children. Other effects are perhaps not fully recognized by all household members and require increased information programs. In general, the household consequences found in Pakistan are quite similar to those found elsewhere. Only with respect to the negative effects on savings is the evidence stronger for Pakistan, probably because of the larger sample sizes that were made available. The negative consequences are the result of trade-offs made by parents, given their range of choices. Increasing their choices by making family planning more widely available with a broad mix of methods will enable them to make choices with less negative consequences.

* The views and interpretations in this document are those of the authors and should not be attributed to the World Bank, to its affiliated organizations or to any individual acting in their behalf.

** The authors would like to thank Lorene Yap of the World Bank, mission leader for which this was a background paper, for excellent suggestions in the design and revision of this work.

TABLE 1: HYPOTHESIZED EFFECTS OF HIGH FERTILITY ON FAMILY WELLBEING AND WORLDWIDE EVIDENCE

A. Health Effects

Dimension of Fertility	Infant/Child Survival	Maternal Survival	Infant/Child Health	Maternal Health
Number of Children	- W	- W	- ID	- ID
Maternal Age	- W	- W	- ID	- ID
Close Child-spacing	- W	- ID	- ID	- ID

B. Economic Effects

Dimension of Children	Education		Labor Supply						Income		Savings	
			Child		Women		Men					
	U	R	U	R	U	R	U	R	U	R	U	R
Number of Children	-ID	-NC	+M	+M	-M	-NC	?	?	?	?	-NC	-NC
Children under 6 or 7	-M	-NC	O	O	-M	-NC	?	?	?	?	-NC	-NC
Males 7 - 14	-M	-NC	+M	+M	-M	-NC	?	?	?	?	-NC	-NC
Female 7 - 14	-M	-NC	+M	+M	-M	-NC	?	?	?	?	-NC	-NC

U = Urban
R = Rural
W = confirmed with world data
M = mixed world data
NC = not confirmed with world data
ID = insufficient world data

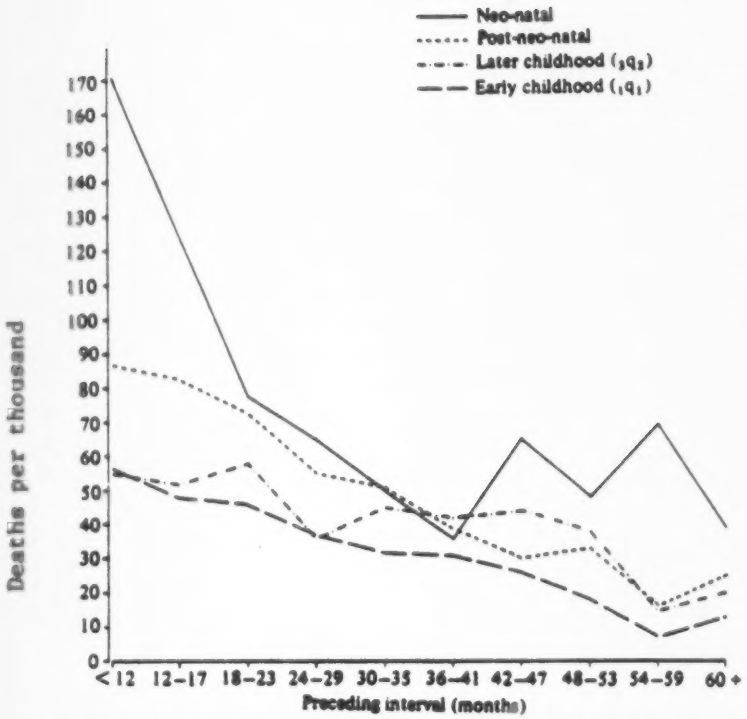

Figure 1. Probabilities of dying per 1,000 by the length of the preceding interval, confined to cases where preceding child survived for two years or longer.

Source: Cleland and Sathar. 1984

TABLE 2: PAKISTAN MORTALITY RISK (% FOR THE GROUP ABOVE (OR BELOW) THAT OF THE REFERENCE GROUP)

	No. of Births												
	Previous 0-2 Years			Previous 2-4 Years									
	One Alive	One Dead	2 or More	One Alive	One Dead	2 or More	4-6	7 or More	1st	20	35 or 20-40	More	Female
	(relative to no births in previous 0-2 years)						(relative to 2-3 in birth order)			(relative to Mother's aged 25-34 years)			(relative to male)
Neo-Natal (9-1 month)													
Pakistan	+30%	+210%	+150%	0	+ 60%	+30%	-10%	-10%	+ 80%	+40%	+10%	0	-20%
South Asia	+60%	+220%	+170%	0	+100%	+60%	-20%	-10%	+100%	+30%	0	-10%	-20%
Worldwide	+70%	+290%	+250%	0	+110%	+40%	0	+20%	+ 80%	+30%	+10%	+20%	-20%
Post Neo-Natal (1-12 mos)													
Pakistan	+60%	+140%	+170%	+20%	+ 60%	+50%	-10%	0	+100%	+10%	0	0	+20%
South Asia	+50%	+100%	+180%	+10%	+ 80%	+50%	-10%	+30%	+ 50%	+30%	+10%	-10%	0
Worldwide	+90%	+240%	+240%	+10%	+110%	+60%	0	+30%	+ 60%	+40%	+20%	0	-10%
Child (1-5 years)													
Pakistan	+50%	+ 30%	+ 50%		n.a.		+10%	0	+ 20%	+40%	+20%	+20%	+30%
South Asia	+40%	+ 10%	+ 60%		n.a.		+20%	+30%	0	+30%	0	-20%	+10%
Worldwide	+50%	+ 60%	+ 60%		n.a.		+30%	+30%	+ 60%	+40%	+10%	+10%	+10%

n.a. = not available

Source: Hobcraft et al. (1985).

TABLE 3: Logit Equations for Participation in School by Females 5-20 in Urban, Low-Income Neighborhoods in Pakistan

Log-Likelihood	-820.36
Restricted (Slopes=0) Log-L	-1055.5
Chi-Squared (17)	470.27
Significance Level	.32173E-13

Variable	Coefficient	T-ratio
Intercept	-2.99	-4.82
Age	0.63*	5.82
Age Sq	-0.35*	-7.80
Exp	4.0x10exp-4	4.69
Hh Entpr	-0.29	1.90
Children, 0-4 yrs	-0.11*	2.45
Males, 15-60 yrs	0.04	-0.86
Males, 60+ yrs	-0.15	-1.07
Males, 10-14 yrs	0.09	1.18
Females, 10-14 yrs	0.08	1.00
Children, 5-9 yrs	-0.11	-1.91
Females, 15-60 yrs	0.14*	2.55
Females, 60+ yrs	0.03	0.15
Pathans	-0.30	-1.81
HH No ed-lit	-0.32	-1.43
HH Primary School	0.41*	2.43
HH Secondary School	1.21*	7.92
HH Higher Education	2.02*	6.07

Note: * Statistically significant at 5% or better.

Source: PIDE/IFPRI sample of 1000 urban, low income households

TABLE 4: Logit Equations for Participation in School by Females 5-20 in Urban, Low-Income Neighborhoods in Pakistan

Log-Likelihood		-899.97
Restricted (Slopes=0) Log-L		-1129.9
Chi-Squared (17)		459.9
Significance Level		32173E-13
Variable	**Coefficient**	**T-ratio**
Intercept	-1.73*	3.18
Age	0.53*	5.86
Age Sq	-0.29*	8.04
Exp	3.8x10exp-4*	4.06
Hh Entpr	-0.65*	-4.70
Children, 0-4 yrs	-0.07	-1.63
Males, 15-60 yrs	-0.02	0.34
Males, 60+ yrs	0.04	0.27
Males, 10-14 yrs	-0.13	-0.18
Females, 10-14 yrs	0.71	0.94
Children, 5-9 yrs	-0.08	-1.26
Females, 15-60 yrs	0.01	0.13
Females, 60+ yrs	0.03	0.15
Pathans	0.37*	2.26
No ed-lit	-0.08	-0.41
Primary School	0.27	1.61
Secondary School	1.12*	7.33
Higher Education	1.63*	5.19

Note: * Statistically significant at 5% or better.

Source: PIDE/IFPRI sample of 1000 urban, low income households

Table 5: Labor Participation of Children in Pakistan and other Developing Countries (Percentage of those 10-14 Participating in the Labor Force)

Pakistan	Urban	Rural	Total
1961 a/			
Males	18.4	45.6	38.3
Females	1.4	6.0	4.7
1972 a/			
Males	26.1	44.8	39.5
Females	10.1	10.4	10.4
1981 a/			
Males	17.8	41.4	34.7
Females	1.4	4.0	3.2
1985 b/			
Males	17.9	36.2	30.7
Females	1.1	9.7	7.0

Egypt c/ 1980	Cairo/ Alex	Urban Lower	Urban Upper	Rural Lower	Rural Upper	Total
Males	8.1	18.1	4.2	28.9	22.2	19.6
Females	0.0	3.7	0.0	13.0	4.6	6.1

Gujarat d/ 1972-3	Urban	Rural
Males	4.4	19.4
Females	1.5	20.3

Maharashtra d/ 1972-3		
Males	5.0	20.1
Females	2.8	22.7

Nepal d/ 1973-4 /74-75	11 Towns	7 Towns
Males	16.0	25.7
Females	14.3	35.0

Sri Lanka d/ 1969-70	Total
Males	6.3
Females	3.5

Taiwan d/	
1968	
Males	12.3
Females	20.1
1974	
Males	1.6
Females	3.9

Table 5, continued

Botswana e/ 1974/75	School Status	Rural Out	Rural In
Males		41.0	30.9
Females		15.8	9.2

Ivory Coast f/
1986 (Worked in last 12 months)

	Urban	Rural	Total
Males	5.0	54.9	35.0
Females	6.4	54.1	31.5
(Worked in the last 7 days)			
Males	3.7	45.1	28.6
Females	5.5	46.2	26.9

Peru f/

1986 (Last 7 days)	Lima	Other urban	Rural	Total
Males	17.5	25.3	63.5	40.6
Females	13.8	20.8	60.3	37.8

Sources: a/ Various Censuses of Pakistan
b/
c/ Hallouda et. al., 1983
d/ Visaria, 1980
e/ Chernichovsky, 1985
f/ Tabulations LSMS

Table 6: Determinants of Labor Participation of Males 10-14 in Urban Pakistan

Variable	Coefficient	
ONE	-4.0022	(-5.807)**
AGEY	0.24415	(4.675)**
Children under 6	0.24366E-01	(0.497)
Females 7-14	-0.32555E-02	(-0.043)
Males 7-14	-0.96223E-01	(-1.226)
Females 15+	-0.10760	(-1.829)*
Males 15+	-0.32104E-02	(-0.062)
HEADILT	0.46073	(3.168)**
PUNJAB	0.28731	(1.894)*
Income of others in household	-0.55883E-04	(-0.281)

Note: * Statistically significant at 5%
** Statistically significant at 1%
Source: PIDE/IFPRI sample of 1000 urban, low income households

Table 7: Logit Estimates for Urban Women's Employment in Urban Pakistan

	Coefficients3/	
Model Intercept	-3.948	(7.3)
Age (yrs)	.085	(3.4)
Age2	-.001	(3.1)
Education Achievement (relative to no education. Equal to 1 if in range app. to category, 0 otherwise)		
Primary School	.369	(1.4)
Middle School	.219	(0.6)
Secondary School	1.605	(5.6)***
University	2.161	(4.2)***
Demographic Factors		
no. children 0-6 yrs in hh	-.066	(1.1)
no. female children, 7-14 yrs in hh	.148	(2.0)*
no. male chidlren, 7-14 years in hh	-.150	(1.9)*
no. adult females in hh	.122	(1.9)*
no. adult males in hh	-.262	(3.9)*
Live in Punjab?	.697	(3.7)**
Head of household's predicted wage rate hr2/	-0.530	(0.9)
Value of Log of Likelihood function		
at zero	-594.36	
at convergence	-546.55	
Chi-squared	95.62	

Note: * Statistically significant at 10%.
** Statistically significant at 5%.
*** Statistically significant at 1%.

Source: Based on the 1986 PIDE/IFPRI urban survey. Includes all women not currently enrolled in school, 10 years or greater.
3/ Asymptotic t-statistics in parentheses.

Table 8: **Summary of Demographic Effects on Urban Males Labor Supply Decisions in Urban Pakistan**

	Additional Hours worked1/	
	Assuming Other Member's Income Is Constant	Assuming Other Income Will Vary
Wage Sector: Additonal hours worked per week per additional household member		
Children 0-6 years old	1.09 hrs	1.16 hrs*
Females		
7-14 years old	2.30 hrs**	1.73 hrs*
Adult (15+ years old)	1.07 hrs	1.15 hrs
Males		
7-14 years old	1.06 hrs	1.14 hrs
Adult (15+ years old)	1.99 hrs**	4.01 hrs**
Self-Employed Sector: Additional hours worked per week per additional household member		
Children 0-6 years old	-.18 hrs	0.43 hrs
Females		
7-14 years old	4.48 hrs**	5.14 hrs**
Adult (15+ years old)	3.33 hrs**	4.12 hrs**
Males		
7-14 years old	3.45 hrs**	4.42 hrs**
Adult (15+ years old)	4.57 hrs**	4.16 hrs**

Note: 1/ * denotes significance at the 95 percent confidence interval
** denotes significance at the 99 percent conficence interval

Source: Analysis of PIDE/IFPRI data as contained in Appendix Table 7

TABLE 9: CHANGES IN MONTHLY SAVINGS IN PAKISTAN ASSOCIATED WITH ADDITIONAL HOUSEHOLD MEMBERS
(Rs. per month)

	Urban Households		Rural Households	
Average savings (Rs/mo.)	59.7		22.0	
Effects of One Additional Person	Direct Effect	Total Effect	Direct Effect	Total Effect
Children under 6 yrs	-3.7*	-0.2*	-9.3*	-5.2*
Males, 6-9 yrs	-5.7	-2.9	-11.5*	-5.9*
Males, 10-14 yrs	-7.9*	-1.9*	-19.1*	-9.3*
Males, 15+ yrs	13.2*	25.8*	0.0	16.3*
Females, 6-9 yrs	-8.3*	-6.4	-10.7*	-6.0*
Females, 10-14 yrs	-8.7*	-3.6*	-21.0*	-5.5*
Females, 15+ yrs	4.7	13.9*	-13.9*	-1.7*

Source: Derived from Appendix Tables 4, 5, 6 and 7

* Statistically significant at 5% in savings equation for direct effect and income equation for indirect effect.

APPENDIX TABLE 1: WAGE EQUATION FOR URBAN MALES, CORRECTED FOR SELECTIVITY BIAS IN URBAN PAKISTAN (DEPENDENT VARIABLE IS LOGE (WAGE RATE/HR)

	Coefficients	T-Ratios
Model Intercept	-.531	1.3
Age (yrs)	.088	6.9**
Age squared	-.0009	5.5**
Educational Achievement (relative to no education. Equal to 1 if in range app. to category, 0 otherwise)		
Primary School	.119	1.9*
Middle School	.134	1.8*
Secondary School	.426	5.3**
University	.778	5.8**
Live in Punjab?	-.188	4.2**
Work in formal sector (e.g., contribute to employees provident fund)	.158	2.8**
Correction Factor	-.053	0.2
R2	36	
F-statistic	53.19	
No. of cases	860	

NOTE

\+ Statistically significant at 10%
* Statistically significant at 5%
** Statistically significant at 1%

Source: Based on the 1986 PIDE/IFPRI urban survey.

APPENDIX TABLE 2: TOBIT LABOR EQUATION FOR MALES IN URBAN PAKISTAN
(DEPENDENT VARIABLE IS HOURS WORKED PER WEEK)

	Coefficients	T-Ratios
Model Intercept	21.44	1.6
Predicted Wage (Rs/hr)[1]		
Employees	8.69	13.9**
Self-Employed	5.11	10.6**
Demographic Effects - Employees		
# children 0-6 yrs in hh	1.09	1.5
# female children, 7-14 yrs in hh	2.30	2.0*
# male children, 7-14 years in hh	1.07	1.2
# adult males in hh	1.99	3.0**
Demographic Effects - Self employed		
# children 0-6 yrs in hh	-.18	0.2
# female children, 7-14 yrs in hh	4.48	3.9**
# male children, 7-14 yrs in hh	3.45	3.0**
# adult females in hh	3.33	3.5**
# adult males in hh	4.57	5.5**
Household income net of indivdual's earnings (Rs/wk)	-.028	15.7**
Mean of Dependent Variable	52.6 hrs	
Value of likelihood function at convergence p2	-8657.8	

NOTE

[1]Total income - predicted earnings per week.

* Statistically significant at 5%.
** Statistically significant at 1%.

Source: Based on 1986 IFPRI urban survey; includes all men not currently enrolled in school, 10 years old and greater.

APPENDIX TABLE 3: DETERMINANTS OF HOURS WORKED BY MEN IN URBAN PAKISTAN (NO INCOME CONTROL)

	Coefficients	T-Ratios
Intercept	-4.8828	-4.070**
Predicted Wage (Rs/hr)		
Employees	9.7745	20.165**
Self-Employees	5.6920	15.269**
For wage sector:		
Children under 7	1.1608	2.093*
Males 7-14	1.1439	1.280
Females 7-14	1.7303	1.903*
Males 15+	2.0078	4.011**
Females 15+	1.1488	1.667+
For self-employed		
Children under 6	0.43301	0.683
Males 7-14	3.8560	4.416**
Females 7-14	5.1373	5.797**
Males 15+	4.1586	6.709**
Females 15+	3.0177	4.120**

NOTE

+ Statistically significant at 10%.
* Statistically significant at 5%.
** Statistically significant at 1%.

Source: 1986 PIDE/IFPRI urban data set.

APPENDIX TABLE 4: DEMOGRAPHICALLY BASED HOUSEHOLD INCOME FUNCTIONS[1] FOR RURAL HOUSEHOLDS
(Rupees per month)

	Wage Dependent Households		Farm Households		Other Households		Total Households	
	Coefficient	t	Coefficient	t	Coefficient	t	Coefficent	t
Model Intercept	95.94	2.01*	193.45	3.42	155.59	3.43**	142.76	4.67**
Age of Household Head	3.50	1.61	6.20	2.66**	2.94	1.50	4.54	3.43**
Age of head^2	-0.04	1.58	-0.05	2.25**	-0.03	1.61	-0.04	3.17**
Education of Head Relative to no education								
Primary School	42.34	2.55**	141.08	7.44**	111.81	7.55**	110.33	10.66**
Middle School	121.49	5.61**	168.20	5.48**	134.27	5.76**	132.32	8.35**
Secondary School	230.00	10.40**	281.78	6.18**	316.61	10.35**	253.30	12.72**
University	322.97	10.66**	108.02	1.06	389.61	5.68**	256.98	7.28**
Demographic Variables								
Children, 0-5 yrs	32.11	6.28**	42.21	7.39**	28.79	5.78**	33.93	10.33**
Males,6-9 yrs	17.20	1.93+	26.84	2.88*	49.95	5.79*	36.46	6.57**
Males, 10-14 yrs	62.92	6.54*	83.10	8.52**	67.14	7.49**	77.68	13.37**
Adult males, 15+ yrs	123.34	13.18**	96.48	14.20**	142.56	21.35**	126.80	30.07**
Females, 6-9 yrs	28.45	93.05**	29.73	3.01**	51.98	5.77**	39.79	6.82**
Females, 10-14 yrs	50.45	4.88**	68.50	6.74**	61.47	6.79**	64.76	10.75**
Adult Females, 15+ yrs	60.07	13.18**	96.67	12.93**	111.51	16.75**	100.01	22.68**
Number of Earners	54.48	5.09**	-26.55	1.53	-3.31	0.400	-3.38	0.57
F-Value	105.35		88.52		176.05		320.28	
R^2	.42		.20		.35		.28	
No. of observations	2084		4873		4544		11503	

---

[1]/ Dependent variables is household savings in Rs/month
* Statistically significant at 10%
* Statistically significant at 5%
** Statistically significant at 1%

Source: 1979 pakistan Household Income and Expenditure Survey.

APPENDIX TABLE 5: DEMOGRAPHIC HOUSEHOLD INCOME FUNCTION 1/ FOR URBAN HOUSEHOLDS
(Rupees per Month)

	Wage Dependent Households		Other Households		Total	
	Coefficient	t	Coefficient	t	Coefficient	t
Model Intercept	24.73	0.32	101.93	0.95	85.90	1.27
Age of Household Head	4.61	1.22	7.05	1.52	4.86	1.64
Age of Household Head^2	- 0.01	0.39	-0.05	1.11	- 0.02	0.71
Education of Head						
Primary Schooling	122.10	5.25**	153.15	5.21**	140.75	7.27**
Middle School	170.72	6.54**	226.20	6.24**	192.61	8.43**
Secondary School	261.69	11.01**	418.87	10.65**	299.62	13.36**
University	683.44	25.52**	792.19	14.02**	672.75	24.57**
Demographic Variables						
No. children, 0-5	35.80	4.99**	56.34	5.60**	48.57	7.70**
Males, 6-9 yrs	19.37	1.51	52.02	2.94**	37.82	3.38**
Males 10-14 yrs	67.31	5.21**	81.96	4.91**	81.95	7.55**
Adult males, 15+ yrs	125.47	11.83**	186.17	14.84**	173.88	20.65**
Females, 6-9 yrs	9.24	0.67	37.01	2.05**	27.01	2.31**
Females, 10-14 yrs	60.81	4.63**	75.51	4.43**	70.62	6.37**
Adult females, 15+ yrs	106.55	11.93**	131.08	10.68**	127.27	16.42**
Number of Earners	118.28	9.10**	-18.55	1.12	20.08	1.89+
F-Value	162.29		91.91		215.67	
R^2	.40		.26		.30	
No. of Observations	3353		3588		6942	

Note: 1/ Dependent variable is household income in Rs/month.
\+ Statistically significant at 10%.
* Statistically significant at 5%.
** Statistically significant at 1%.

Source: 1979 Pakistan Household Income and Expenditure Survey.

3159I:p66

APPENDIX TABLE 6: DEMOGRAPHIC HOUSEHOLD SAVINGS FUNCTIONS 1/ FOR RURAL HOUSEHOLDS
(Rupees per Month)

	Wage Dependent Households		Farm Households		Other Households		Total Rural	
	Coefficient	t	Coefficient	t	Coefficient	t	Coefficient	t
Model Intercept	-39.78	1.49	-48.78	1.81+	-38.93	1.76+	-40.09	2.65**
Predicted Income (Rs/month)	0.01	0.41	0.17	3.85**	0.16	4.97**	0.12	4.82**
Residual Income (Rs/month)	0.12	8.07**	0.37	45.28**	0.26	33.14**	0.30	58.23**
Residual Income Squared	0.00	11.28**	0.00	33.93**	0.00	33.24**	0.00	53.55**
Age of Household Head	1.19	1.01	- 0.62	0.57	0.61	0.67	0.36	0.58
Age of Head^2	- 0.01	0.80	- 0.01	0.58	0.01	0.95	-0.00	0.33
Demographic Variables								
No. children, 0-5 yrs	- 9.19	3.02**	- 7.94	2.46**	-11.99	4.74**	- 9.32	5.20**
Males, 6-9 yrs	- 2.20	0.45	-16.16	3.67**	-14.01	3.27**	-11.47	4.21**
Males, 10-14 yrs	- 8.45	1.44	-24.62	4.26**	-20.89	4.45**	-19.14	5.68**
Males, 15+ yrs	19.76	2.94**	- 9.03	1.74+	- 1.40	0.26	0.85	0.23
Females, 6-9 yrs	- 7.38	1.43	-18.76	3.99**	- 7.31	1.63	-10.71	3.70**
Females, 10-14 yrs	-10.84	1.81	-23.74	4.29**	-25.70	5.49**	-21.04	6.41**
Adult Females, 15+ yrs	-12.97	2.76**	-16.35	2.99**	-17.59	3.59**	-13.86	4.18
F-value	42.87		699.25		379.41		1164.21	
R^2	.20		.62		.50		.55	
No. of observations	2084		4873		4544		11503	

Note: 1/ Dependent variable is household savings in Rs/month
+ Statistically significant at 10%
* Statistically significant at 5%
** Statistically significant at 1%

Source: 1979 Pakistan Household Income and Expenditure Survey.

Appendix 7: DEMOGRAPHIC HOUSEHOLD SAVINGS FUNCTION 1/ FOR URBAN HOUSEHOLDS
Rupees per Month)

	Wage Dependent Households		Other Households		Total	
	Coefficient	t	Coefficient	t	Coefficient	t
Model Intercept	-80.18	2.62**	-35.24	0.96	-44.58	1.87*
Predicted Income (R/s month)	0.11	7.68**	0.07	3.45**	0.07	5.38**
Residual Income (Rs/month)	0.16	18.82**	0.19	23.34**	0.17	29.88**
Residual Income squared	0.00	31.08**	0.00	34.30**	0.00	47.34**
Age of Household Head	- 0.03	0.02	- 1.37	0.88	- 1.05	1.01
Age of Household Head^2	- 0.00	0.20	0.02	0.99	0.01	0.99
Demographic Variables						
No. children, 0-5 yrs	- 5.75	2.00**	- 2.82	0.79	- 3.70	1.62
Males, 6-9 yrs	- 9.65	1.91+	- 1.17	0.19	- 5.68	1.44
Males, 10-14 yrs	14.44	2.77**	- 6.60	1.12	- 7.89	1.98*
Adult males, 15+ yrs	9.51	2.20*	10.28	2.00*	13.22	3.77**
Females, 6-9 yrs	-17.65	3.24**	- 0.33	0.05	- 8.35	2.03*
Females, 10-14 yrs	-14.92	2.85**	- 5.77	0.96	- 8.72	2.17*
Adult females, 15+ yrs	- 0.46	0.11	4.70	0.95	4.68	1.42
F-value	291.04		397.06		714.78	
R2	.51		.57		.55	
No. of observations	3353		3586		6940	

Note: 1/ Dependent variable is household income in Rs/month.
* Statistically significant at 10%
+ Statistically significant at 15%
** Statistically significant at 1%

Source: 1979 Pakistan Household Income and Expenditure Survey.

31591: p67.

Bibliography

Alauddin, Mohammed, "Maternal Mortality in Rural Bangladesh: The Tangail District," Studies in Family Planning,17, 1, (1986), pp. 13-21.

Alderman, Harold, et al, "Household Food Security in Pakistan with Reference to the Ration Shop System", International Food Policy Research Institute Working Paper on Food Subsidies No. 4, May, 1988.

Akhtar, Sajjad, "Household Savings Behavior in Urban Pakistan," Applied Economics Research Center University of Karachi, Research Report No. 64, October, 1986.

Becker, Gary, "An Economic Analysis of Fertility," in Universities National Bureau, Committee for Economic Research, Demographic and Economic Change in Developed Countries (Princeton: Princeton University Press, 1960).

----------, "A Theory of the Allocation of Time," Economic Journal, 75, 299, September, 1965.

---------- and Lewis G. H., "On the Interaction between Quantity and Quality of Children," Journal of Political Economy, 81, 2, Pt. 2, March/April, 1973.

Birdsall, Nancy and Cochrane, Susan, "Education and Parental Decision Making: A two-Generation Approach," in Education and Development, edited by Lascelles Anderson and Douglas M. Windham (Lexington, Mass: D.C. Heath, 1982), pp. 175-210.

---------- and Griffin, Charles, "Population Growth and Poverty in Developing Countries", draft, July, 1987.

Bowman, Mary Jean and Anderson, C. Arnold, "The Participation of Women in Education in the Third World," in Women's Education in the Third World: Comparative Perspectives, edited by Gail P. Kelly and Carolyn M. Elliot, (Albany: State University of New York Press, 1982), 11-30.

Cain, Mead T., " The Economic Activities of Children in a Village in Bangladesh," Population and Development Review, 3(3), September, 1977, pp.?

Chen, Lincoln, et al, "Maternal Mortality in Rural Bangladesh," Studies in Family Planning, 5(11), 1974, pp. 334-341.

Cheong, K. C., et al, "Report on Employment Issues in Pakistan," Mimeo, August 3, 1987.

Chernichovsky, Dov, "Personal Savings and Family Size and Composition: The Unresolved Issue," IUSSP Conference on Economic and Demographic Change: Issues for the 1980s', Helsinki, 1978.

----------, "Socioeconomic and Demographic Aspects of School Enrollment and Attendance in Rural Botswana," Economic Development and Cultural Change, 1985, pp. 319-332.

Cleland, J. and Sathar, Z., "The Effect of Birth Spacing on Childhood Mortality in Pakistan," Population Studies, 38(3), November, 1984, pp. 401-418.

Cochrane, Susan H. and Jamison Dean T., "Educational Attainment and Achievement in Rural Thailand," New Directions for Testing and Measurement: Productivity Assessment in Education, No. 15, (September, 1982), pp. 43-59.

----------, Mehra, Kalapana, and Osheba, Ibrahim Taha, "The Educational Participation of Egyptian Children," Education and Training Series, Report No. EDT45, World Bank, December, 1986.

----------, "Children as By-products, Investment Goods and Consumer Goods: A Review of Some Micro-economic Models of Fertility," Population Studies, 29, 3, November, 1975.

----------, and Yazbeck, Abdo, " Determinants of Labor Participation in Egypt," in draft, 1987.

de Tray, Dennis, "Children's work Activities in Malaysia," Population and Development Review, 9(3), September, 1983, pp. 437-455.

----------, Schooling and Family Size, R2301-NICHD, (Santa Monica: Rand Corporation, 1978).

Frank, Odile, and McNicoll, Geoffrey, "An Interpretation of Fertility and Population Policy in Kenya," Population and Development Review, 13(2), June, 1987, pp. 209-243.

Hallouda, Awad M., et al, "Socio-Economic Differentials and Comparative Data from Husbands and Wives," The Egyptian Fertility Survey, 1980, vol III, (Cairo: Central Agency for Public Mobilization and Statistics, 1983).

Hammer, Jeffery S., "Population Growth and Savings in Developing Countries: A Survey," World Bank Staff Working Paper No. 687, March, 1985.

Hart, Gillian, "Patterns of Household Labor Allocation in a Javanese Village," in Rural Household Studies in Asia, edited by Hans Binswanger et al. (Singapore: Singapore University Press, 1980).

Hobcraft, J. N., McDonald, J. W., and Rutstein, S.O., "Demographic Determinants of Infant and Early Child Mortality: A Comparative Analysis," Population Studies, 39(3), November, 1985, pp. 363-386.

Kelley, Allen C., "Interactions of Economic and Demographic Household Behavior," in Population and Economic Change in Developing Countries, edited by Richard A. Easterlin (Chicago: The University of Chicago Press, 1980), pp. 403-470.

----------, and Swartz, Caroline, "The Impact of Family Structure on Microeconomic Decision Making in Developing Countries: A Case Study of Nuclear and Extended Families in Urban Kenya," IUSSP Conference on Economic and Demographic Change: Issues for the 1980s', Helsinki, 1978.

---------- and Williamson, Jeffery G., "Household Saving Behavior in the Developing Economies: The Indonesian Case," Economic Development and Cultural Change, 16(3), April, 1968, pp. 385-403.

Khaliqzzaman, "Female Labor Force Participation in Economic Activities," draft paper Punjab Economic Research Institute, Lahore, Pakistan, 1987.

Khan, Mohammed Ali, and Serageldin, Ismail, "Education, Income and Fertility in Pakistan," Economic Development and Cultural Change, 27(3), April, 1979, pp. 519-547.

Khan, A. R. et al., "Maternal Mortality in Rural Bangladesh: The Jamalpur District," Studies in Family Planning, 17, 1, (1986), pp.7-12.

King, Elizabeth M., "The Effect of Family Size on Family Welfare: What Do We Know?," in Population Growth and Economic Development: Issues and Evidence edited by D. Gale Johnson and Ronald D. Lee (Madison: The University of Wisconsin Press, 1987), pp. 373-411.

----------, and Evenson, Robert E., "Time Allocation and Home Production in Philippine Rural Households," in Women and Poverty in the Third World, edited by M. Buvinic, M. Lycette, and W. P. McGreevey (Baltimore: The Johns Hopkins University Press, 1983), pp. 35-61.

---------- et al, "Changes in the Status of Women Across Generations in Asia," Rand R-3399RF, December, 1986.

Lindert, Peter H., "Child Costs and Economic Development," in Population and Economic Change in Developing Countries, edited by Richard A. Easterlin (Chicago: The University of Chicago Press, 1980), pp. 5-79.

Maine, Deborah, "Mothers in Peril: The Heavy Toll of Needless Death," People, 12(2), 1985, pp. 6-8.

Malthus, Thomas Robert, An Essay on the Principle of Population as It Affects The Future Improvement Of Society (London: Printed for J. Johnson, in St. Paul's Church-Yard, 1798).

Mueller, Eva, " Income, Aspirations and Fertility in Rural Areas of Less Developed Countries," in Rural Development and Human Fertility, edited by Wayne A. Schutjer and C. Shannon Stokes (New York: Macmillan Publishing Company, 1984), pp. 121-150.

Mueller, Eva, " The Value and Allocation of Time in Rural Botswana," The World Bank, Population and Human Resources Division Discussion Paper No. 81-44, 1981.

Nag, Moni, et al, "An Anthropological Approach to the Economic Value of Children in Java and Nepal," in Rural Household Studies in Asia, edited by Hans Binswanger et al. (Singapore: Singapore University Press, 1980).

Neher, Philip, "Peasants, Procreation and Pensions," American Economic Review, 61, 2, (JUne, 1971), pp. 380-389.

Nerlove, Marc, "The New Home Economics: A Theory of Household Choice and Decision Making?" paper presented at the Population Association of America Meetings, New Orleans, April, 1973.

Pebley, Anne R. and Millman, Sara, "Birthspacing and Child Survival," International Family Planning Perspectives, 12(3), September, 1986, pp. 71-79.

Qureshi, Tahira, "Determinants of Malnutrition," Applied Economics Research Center University of Karachi, Discussion Paper #50, August, 1982.

Robinson, Warren C., Shah, Makhdoor A., and Shah, Nasra M., "The Family Planning Program in Pakistan: What Went Wrong?" International Family Planning Perspectives, 7 (3), September, 1981, pp. 85-92.

Rodgers, Gerry and Standing, Guy (eds), Child Work, Poverty, and Underdevelopment. (Geneva: International Labor Organization, 1981)

Rosenzweig, M. R., and R. Evenson, "Fertility, Schooling and the Economic Contribution of Children in Rural India: An econometric Analysis", Econometrica, 45(5), July, 1977, pp. 1065-790.

----------, and Schultz, T. Paul, "Market Opportunities, Genetic Endowments, and Intrafamily Distribution: Child Survival in Rural India," American Economic Review, 72, 4, September, 1982, pp. 803-815.

----------, "The Value of Children's Time, Family Size and Non-Household Child Activities in A developing Country: Evidence from Household Data", Research in Population Economics, vol. 1, 1978.

Sathar, Z., "Seeking Explanations for High Levels of Infant

Mortality in Pakistan," The Pakistan Development Review, XXVI(1), Spring, 1987, pp. 55-70.

Schultz, T. Paul, "A Preliminary Survey of Economic Analysis of Fertility," American Economic Review: Papers and Proceedings, 63 (May, 1973), pp. 71-78.

Schultz, Theodore W., "The Value of Children: An Economic Perspective," Journal of Political Economy, 81, 2, Pt 2, (March/April, 1973), pp. s2-s13.

Sotoudeh-Zand, Mahmoud, "The Economic Value of Children," (Islamabad: National Institute of Population Studies, 1987).

Standing, Guy, "Women's Work Activity and Fertility," in Determinants of Fertility in Developing Countries, edited by Rodolfo A. Bulatao and Ronald D. Lee. (New York: Academic Press, 1983)

Tan, Jee Peng and Haines, Michael, "Schooling and Demand for Children: Historical Perspectives," World Bank Staff Working Paper No. 697, November, 1984.

Visaria, Pravin, "Poverty and Living Standards in Asia: An Overview of the Main Results and Lessons of Selected Household Surveys," Living Standards Measurement Study Working Paper No. 2, (Washington, D.C.: World Bank, 1980).

Winikoff, Beverly and Sullivan, Maureen, "Assessing the Role of Family Planning in Reducing Maternal Mortality," Studies in Family Planning, 18(3), May/June, 1987, pp. 128-143.

Winikoff, Beverly and Castle, Mary Ann, "The Maternal Depletion Syndrome: Clinical Diagnosis or Eco-demographic Condition?", Technical Background Paper for the International Conference on Better Health for Women and Children through Family Planning, Nairobi, Kenya, October 5-9, 1987.

Youtopoulos, Pan A. and Nugent, Jeffrey B., Economics of Development, Empirical Investigation, (New York: Harper and Row, 1976).

Distributors of World Bank Publications

ARGENTINA
Carlos Hirsch, SRL
Galeria Guemes
Florida 165, 4th Floor-Ofc. 453/465
1333 Buenos Aires

AUSTRALIA, PAPUA NEW GUINEA, FIJI, SOLOMON ISLANDS, VANUATU, AND WESTERN SAMOA
D.A. Books & Journals
648 Whitehorse Road
Mitcham 3132
Victoria

AUSTRIA
Gerold and Co.
Graben 31
A-1011 Wien

BAHRAIN
Bahrain Research and Consultancy Association Ltd.
P.O. Box 22103
Manama Town 317

BANGLADESH
Micro Industries Development Assistance Society (MIDAS)
House 5, Road 16
Dhanmondi R/Area
Dhaka 1209

Branch office:
156, Nur Ahmed Sarak
Chittagong 4000

76, K.D.A. Avenue
Kulna

BELGIUM
Jean De Lannoy
Av. du Roi 202
1060 Brussels

BRAZIL
Publicacoes Tecnicas Internacionais Ltda.
Rua Peixoto Gomide, 209
01409 Sao Paulo, SP

CANADA
Le Diffuseur
C.P. 85, 1501B rue Ampère
Boucherville, Québec
J4B 5E6

CHINA
China Financial & Economic Publishing House
8, Da Fo Si Dong Jie
Beijing

COLOMBIA
Infoenlace Ltda.
Apartado Aereo 34270
Bogota D.E.

COTE D'IVOIRE
Centre d'Edition et de Diffusion Africaines (CEDA)
04 B.P. 541
Abidjan 04 Plateau

CYPRUS
MEMRB Information Services
P.O. Box 2098
Nicosia

DENMARK
Samfundslitteratur
Rosenoerns Allé 11
DK-1970 Frederiksberg C

DOMINICAN REPUBLIC
Editora Taller, C. por A.
Restauración e Isabel la Católica 309
Apartado Postal 2190
Santo Domingo

EL SALVADOR
Fusades
Avenida Manuel Enrique Araujo #3530
Edificio SISA, 1er. Piso
San Salvador

EGYPT, ARAB REPUBLIC OF
Al Ahram
Al Galaa Street
Cairo

The Middle East Observer
8 Chawarbi Street
Cairo

FINLAND
Akateeminen Kirjakauppa
P.O. Box 128
SF-00101
Helsinki 10

FRANCE
World Bank Publications
66, avenue d'Iéna
75116 Paris

GERMANY, FEDERAL REPUBLIC OF
UNO-Verlag
Poppelsdorfer Allee 55
D-5300 Bonn 1

GREECE
KEME
24, Ippodamou Street Platia Plastiras
Athens-11635

GUATEMALA
Librerias Piedra Santa
Sa. Calle 7-55
Zona 1
Guatemala City

HONG KONG, MACAO
Asia 2000 Ltd.
6 Fl., 146 Prince Edward Road, W.
Kowloon
Hong Kong

HUNGARY
Kultura
P.O. Box 149
1389 Budapest 62

INDIA
Allied Publishers Private Ltd.
751 Mount Road
Madras - 600 002

Branch offices:
15 J.N. Heredia Marg
Ballard Estate
Bombay - 400 038

13/14 Asaf Ali Road
New Delhi - 110 002

17 Chittaranjan Avenue
Calcutta - 700 072

Jeyadeva Hostel Building
5th Main Road Gandhinagar
Bangalore - 560 009

3-5-1129 Kachiguda Cross Road
Hyderabad - 500 027

Prarthana Flats, 2nd Floor
Near Thakore Baug, Navrangpura
Ahmedabad - 380 009

Patiala House
16-A Ashok Marg
Lucknow - 226 001

INDONESIA
Pt. Indira Limited
Jl. Sam Ratulangi 37
P.O. Box 181
Jakarta Pusat

ITALY
Licosa Commissionaria Sansoni SPA
Via Benedetto Fortini, 120/10
Casella Postale 552
50125 Florence

JAPAN
Eastern Book Service
37-3, Hongo 3-Chome, Bunkyo-ku 113
Tokyo

KENYA
Africa Book Service (E.A.) Ltd.
P.O. Box 45245
Nairobi

KOREA, REPUBLIC OF
Pan Korea Book Corporation
P.O. Box 101, Kwangwhamun
Seoul

KUWAIT
MEMRB Information Services
P.O. Box 5465

MALAYSIA
University of Malaya Cooperative Bookshop, Limited
P.O. Box 1127, Jalan Pantai Baru
Kuala Lumpur

MEXICO
INPOTEC
Apartado Postal 22-860
14060 Tlalpan, Mexico D.F.

MOROCCO
Société d'Etudes Marketing Marocaine
12 rue Mozart, Bd. d'Anfa
Casablanca

NETHERLANDS
InOr-Publikaties b.v.
P.O. Box 14
7240 BA Lochem

NEW ZEALAND
Hills Library and Information Service
Private Bag
New Market
Auckland

NIGERIA
University Press Limited
Three Crowns Building Jericho
Private Mail Bag 5095
Ibadan

NORWAY
Narvesen Information Center
Book Department
P.O. Box 6125 Etterstad
N-0602 Oslo 6

OMAN
MEMRB Information Services
P.O. Box 1613, Seeb Airport
Muscat

PAKISTAN
Mirza Book Agency
65, Shahrah-e-Quaid-e-Azam
P.O. Box No. 729
Lahore 3

PERU
Editorial Desarrollo SA
Apartado 3824
Lima

PHILIPPINES
National Book Store
701 Rizal Avenue
P.O. Box 1934
Metro Manila

International Book Center
Fifth Floor, Filipinas Life Building
Ayala Avenues, Makati
Metro Manila

POLAND
ORPAN
Palac Kultury i Nauki
00-901 Warszawa

PORTUGAL
Livraria Portugal
Rua Do Carmo 70-74
1200 Lisbon

SAUDI ARABIA, QATAR
Jarir Book Store
P.O. Box 3196
Riyadh 11471

MEMRB Information Services
Branch offices:
Al Alia Street
Al Dahna Center
First Floor
P.O. Box 7188
Riyadh

Haji Abdullah Alireza Building
King Khaled Street
P.O. Box 3969
Dammam

33, Mohammad Hassan Awad Street
P.O. Box 3078
Jeddah

SINGAPORE, TAIWAN, MYANMAR, BRUNEI
Information Publications Private, Ltd.
02-06 1st Fl., Pei-Fu Industrial Bldg.
24 New Industrial Road
Singapore 1953

SOUTH AFRICA, BOTSWANA
For single titles:
Oxford University Press Southern Africa
P.O. Box 1141
Cape Town 8000

For subscription orders:
International Subscription Service
P.O. Box 41095
Craighall
Johannesburg 2024

SPAIN
Mundi-Prensa Libros, S.A.
Castello 37
28001 Madrid

Libreria Internacional AEDOS
Consell de Cent, 391
08009 Barcelona

SRI LANKA AND THE MALDIVES
Lake House Bookshop
P.O. Box 244
100, Sir Chittampalam A. Gardiner Mawatha
Colombo 2

SWEDEN
For single titles:
Fritzes Fackbokforetaget
Regeringsgatan 12, Box 16356
S-103 27 Stockholm

For subscription orders:
Wennergren-Williams AB
Box 30004
S-104 25 Stockholm

SWITZERLAND
For single titles:
Librairie Payot
6, rue Grenus
Case postale 381
CH 1211 Geneva 11

For subscription orders:
Librairie Payot
Service des Abonnements
Case postale 3312
CH 1002 Lausanne

TANZANIA
Oxford University Press
P.O. Box 5299
Dar es Salaam

THAILAND
Central Department Store
306 Silom Road
Bangkok

TRINIDAD & TOBAGO, ANTIGUA BARBUDA, BARBADOS, DOMINICA, GRENADA, GUYANA, JAMAICA, MONTSERRAT, ST. KITTS & NEVIS, ST. LUCIA, ST. VINCENT & GRENADINES
Systematics Studies Unit
#9 Watts Street
Curepe
Trinidad, West Indies

TURKEY
Haset Kitapevi, A.S.
Istiklal Caddesi No. 469
Beyoglu
Istanbul

UGANDA
Uganda Bookshop
P.O. Box 7145
Kampala

UNITED ARAB EMIRATES
MEMRB Gulf Co.
P.O. Box 6097
Sharjah

UNITED KINGDOM
Microinfo Ltd.
P.O. Box 3
Alton, Hampshire GU34 2PG
England

URUGUAY
Instituto Nacional del Libro
San Jose 1116
Montevideo

VENEZUELA
Libreria del Este
Apdo. 60.337
Caracas 1060-A

YUGOSLAVIA
Jugoslovenska Knjiga
P.O. Box 36
Trg Republike
YU-11000 Belgrade

BEST COPY AVAILABLE

Recent World Bank Discussion Papers *(continued)*

No. 80 *Environmental Management in Development: The Evolution of Paradigms*. Michael E. Colby

No. 81 *Latin America's Banking Systems in the 1980s: A Cross Country Comparison*. Felipe Morris, Mark Dorfman, Jose Pedro Ortiz, and others.

No. 82 *Why Educational Policies Can Fail: An Overview of Selected African Experiences*. George Psacharopoulos

No. 83 *Comparative African Experiences in Implementing Educational Policies*. John Craig

No. 84 *Implementing Educational Policies in Ethiopia*. Fassil R. Kiros

No. 85 *Implementing Educational Policies in Kenya*. G. S. Eshiwani

No. 86 *Implementing Educational Policies in Tanzania*. C. J. Galabawa

No. 87 *Implementing Educational Policies in Lesotho*. T. Sohl Thelejani

No. 88 *Implementing Educational Policies in Swaziland*. Cisco Magalula

No. 89 *Implementing Educational Policies in Uganda*. Cooper F. Odaet

No. 90 *Implementing Educational Policies in Zambia*. Paul P. W. Achola

No. 91 *Implementing Educational Policies in Zimbabwe*. O. E. Maravanyika

No. 92 *Institutional Reforms in Sector Adjustment Operations: The World Bank's Experience*. Samuel Paul

No. 93 *Assessment of the Private Sector: A Case Study and Its Methodological Implications*. Samuel Paul

No. 94 *Reaching the Poor through Rural Public Employment: A Survey of Theory and Evidence*. Martin Ravallion

No. 95 *Education and Development: Evidence for New Priorities*. Wadi D. Haddad and others

No. 96 *Household Food Security and the Role of Women*. J. Price Gittinger and others

No. 97 *Problems of Developing Countries in the 1990s. Volume I: General Topics*. F. Desmond McCarthy, editor

No. 98 *Problems of Developing Countries in the 1990s. Volume II: Country Studies*. F. Desmond McCarthy, editor

No. 99 *Public Sector Management Issues in Structural Adjustment Lending*. Barbara Nunberg

No. 100 *The European Communities' Single Market: The Challenge of 1992 for Sub-Saharan Africa*. Alfred Tovias

No. 101 *International Migration and Development in Sub-Saharan Africa. Volume I: Overview*. Sharon Stanton Russell, Karen Jacobsen, and William Deane Stanley

No. 102 *International Migration and Development in Sub-Saharan Africa. Volume II: Country Analyses*. Sharon Stanton Russell, Karen Jacobsen, and William Deane Stanley

No. 103 *Agricultural Extension for Women Farmers in Africa*. Katrine Saito and C. Jean Weidemann

No. 104 *Enterprise Reform and Privatization in Socialist Economies*. Barbara Lee and John Nellis

No. 105 *Redefining the Role of Government in Agriculture for the 1990s*. Odin Knudsen, John Nash, and others

No. 106 *Social Spending in Latin America: The Story of the 1980s*. Margaret E. Grosh

No. 107 *Kenya at the Demographic Turning Point? Hypotheses and a Proposed Research Agenda*. Allen C. Kelley and Charles E. Nobbe

No. 108 *Debt Management Systems*. Debt and International Finance Division

No. 109 *Indian Women: Their Health and Economic Productivity*. Meera Chatterjee

No. 110 *Social Security in Latin America: Issues and Options for the World Bank*. William McGreevey

BEST COPY AVAILABLE

The World Bank

Headquarters
1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

Telephone: (202) 477-1234
Facsimile: (202) 477-6391
Telex: WUI 64145 WORLDBANK
RCA 248423 WORLDBK
Cable Address: INTBAFRAD
WASHINGTONDC

European Office
66, avenue d'Iéna
75116 Paris, France

Telephone: (1) 40.69.30.00
Facsimile: (1) 47.20.19.66
Telex: 842-620628

Tokyo Office
Kokusai Building
1-1 Marunouchi 3-chome
Chiyoda-ku, Tokyo 100, Japan

Telephone: (3) 214-5001
Facsimile: (3) 214-3657
Telex: 781-26838

BEST COPY AVAILABLE

ISBN 0-8213-1726-1

Paper Number 111

The World Bank